

Abstract of the Disclosure

An optical identification element 8 includes an optical substrate 10 having at least one diffraction grating 12 disposed therein. The grating 12 having a plurality of
5 colocated pitches Λ which represent a unique identification digital code that is detected when illuminated by incident light 24. The incident light 24 may be directed transversely from the side of the substrate 10 with a narrow band (single wavelength) or multiple wavelength source, in which case the code is represented by a spatial distribution of light or a wavelength spectrum, respectively. The element 8 can
10 provide a large number of unique codes, e.g., greater than 67 million codes, and can withstand harsh environments. The element 8 can be used in any application that requires sorting, tagging, tracking or identification, and can be made on a micron scale “microbeads” if desired, or larger “macrobeads” for larger applications. The code may be digital binary or may be other numerical bases.

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